

CLAIMS

What is claimed is:

- 5 1. In a data communications device having a network address translation data structure, a method for managing network traffic using network address translation, the method comprising the steps of:
- 10 in the network address translation data structure, creating a first entry to coordinate a first data flow from a server to a client, and concurrently creating a second entry to coordinate a second data flow from the client to the server;
- conveying a data element of the first data flow from the server to the client based on the first entry; and
- conveying a data element of the second data flow from the client to the server based on the second entry.
- 15 2. The method of claim 1 wherein the network traffic includes Real-Time Streaming Protocol packets, wherein the data element of the first data flow is a Real-Time Transport Protocol packet, and wherein the data element of the second data flow is a Real-Time Transport Protocol Control Protocol packet.
- 20 3. The method of claim 1 wherein the step of creating the first entry and concurrently creating the second entry includes the step of:
- storing, in the first entry, a port number X; and
- storing, in the second entry, a port number X+1, wherein X is a positive integer.
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4. The method of claim 1, further comprising the step of:

configuring the data communications device to operate as a gateway between a first network in which multiple servers reside, and a second network in which multiple clients reside, wherein the multiple servers includes the server from which the data element of the first data flow is conveyed, and wherein the multiple clients include the client from which the data element of the second data flow is conveyed.

5. A data communications device, comprising:

a network interface which is capable of connecting to a client and a server;

memory to store a network address translation data structure; and

a controller coupled to the network interface and the memory, the controller being configured to:

in the network address translation data structure stored in the memory, create a first entry to coordinate a first data flow from the server to the client, and concurrently create a second entry to coordinate a second data flow from the client to the server,

based on the first entry, convey a data element of the first data flow from the server to the client through the network interface, and

based on the second entry, convey a data element of the second data flow from the client to the server through the network interface.

6. The data communications device of claim 5 wherein the network traffic includes Real-Time Streaming Protocol packets, wherein the data element of the first data flow is a Real-Time Transport Protocol packet, and wherein the data element of the second data flow is a Real-Time Transport Protocol Control Protocol packet.

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7. The data communications device of claim 5 wherein the first entry includes a port number X , wherein the second entry includes a port number $X+1$, and wherein X is a positive integer.

- 10 8. The data communications device of claim 5 wherein the controller is configured to operate as a gateway between a first network in which multiple servers reside, and a second network in which multiple clients reside, wherein the multiple servers includes the server from which the data element of the first data flow is conveyed, and wherein the multiple clients include the client from which the data element of the second data flow is conveyed.
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9. A data communications system, comprising:

a server;

a communications medium; and

a data communications device coupled to the server through the
communications medium, the data communications device including:

a network interface which is capable of connecting
to (i) the server through the communications medium, and
(ii) a client,

memory to store a network address translation data
structure, and

a controller coupled to the network interface and
the memory, the controller being configured to:

in the network address translation
data structure, create a first entry to
coordinate a first data flow from the server
to the client, and concurrently create a
second entry to coordinate a second data
flow from the client to the server,

based on the first entry, convey a
data element of the first data flow from the
server to the client through the network
interface, and

based on the second entry, convey a
data element of the second data flow from
the client to the server through the network
interface.

10. A computer program product that includes a computer readable medium having instructions stored thereon for managing network traffic in a computerized device using network address translation, such that the instructions, when carried out by the computerized device, cause the computerized device to perform the steps of:
- 5 in a network address translation data structure, creating a first entry to coordinate a first data flow from a server to a client, and concurrently creating a second entry to coordinate a second data flow from the client to the server;
- 10 conveying a data element of the first data flow from the server to the client based on the first entry; and
- conveying a data element of the second data flow from the client to the server based on the second entry.

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11. A data communications device, comprising:

a network interface which is capable of connecting to a client and a server;

memory to store a network address translation data structure; and

5 a controller coupled to the network interface and the memory, the controller including:

means for creating, in the network address translation data structure, a first entry to coordinate a first data flow from the server to the client, and concurrently creating, in the network address translation data structure, a second entry to coordinate a second data flow from the client to the server,

10 means for conveying a data element of the first data flow from the server to the client through the network interface based on the first entry, and

15 means for conveying a data element of the second data flow from the client to the server through the network interface based on the second entry.

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12. In a data communications device having a network address translation data structure, a method for managing network traffic using network address translation, the method comprising the steps of:
- conveying a data element of a first data flow from a server to a client and concurrently creating, in the network address translation data structure, a first entry to coordinate the first data flow from the server to the client;
- receiving a command from the server and creating, in the network address translation data structure, a second entry to coordinate a second data flow from the client to the server in response to the command; and
- conveying a data element of the second data flow from the client to the server based on the second entry.
13. The method of claim 12 wherein the network traffic includes Real-Time Streaming Protocol packets, wherein the data element of the first data flow is a Real-Time Transport Protocol packet, and wherein the data element of the second data flow is a Real-Time Transport Protocol Control Protocol packet.
14. The method of claim 12 wherein the step of conveying the data element of the first data flow and creating the first entry includes the step of storing, in the first entry, a port number X; and wherein the step of receiving the command and creating the second entry includes the step of storing, in the second entry, a port number X+1; and wherein X is a positive integer.

15. The method of claim 12, further comprising the step of:

5 configuring the data communications device to operate as a gateway between a first network in which multiple servers reside, and a second network in which multiple clients reside, wherein the multiple servers includes the server from which the data element of the first data flow is conveyed, and wherein the multiple clients include the client from which the data element of the second data flow is conveyed.

16. A data communications device, comprising

10 a network interface which is capable of connecting to a client and a server;

memory to store a network address translation data structure; and

a controller coupled to the network interface and the memory, the controller being configured to:

15 convey a data element of a first data flow from a server to a client and concurrently create, in the network address translation data structure, a first entry to coordinate the first data flow from the server to the client;

20 receive a command from the server and create, in the network address translation data structure, a second entry to coordinate a second data flow from the client to the server in response to the command; and

25 convey a data element of the second data flow from the client to the server based on the second entry.

17. The data communications device of claim 16 wherein the network traffic includes Real-Time Streaming Protocol packets, wherein the data element of the first data flow is a Real-Time Transport Protocol packet, and wherein the data element of the second data flow is a Real-Time Transport Protocol Control Protocol packet.
18. The data communications device of claim 16 wherein the first entry includes a port number X, wherein the second entry includes a port number X+1, and wherein X is a positive integer.
19. The data communications device of claim 16 wherein the controller is configured to operate as a gateway between a first network in which multiple servers reside, and a second network in which multiple clients reside, wherein the multiple servers includes the server from which the data element of the first data flow is conveyed, and wherein the multiple clients include the client from which the data element of the second data flow is conveyed.

20. A data communications system, comprising:

a server;

a communications medium; and

a data communications device coupled to the server through the

5 communications medium, the data communications device including:

a network interface which is capable of connecting
to (i) the server through the communications medium, and
(ii) a client,

memory to store a network address translation data
structure, and

a controller coupled to the network interface and
the memory, the controller being configured to:

convey a data element of a first data
flow from a server to a client through the
network interface and concurrently create,
15 in the network address translation data
structure, a first entry to coordinate the first
data flow from the server to the client;

receive a command from the server
20 through the network interface and create,
in the network address translation data
structure, a second entry to coordinate a
second data flow from the client to the
server in response to the command; and

25 convey a data element of the
second data flow from the client to the
server through the network interface based
on the second entry.

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21. A computer program product that includes a computer readable medium having instructions stored thereon for managing network traffic in a computerized device using network address translation, such that the instructions, when carried out by the computerized device, cause the computerized device to perform the steps of:

conveying a data element of a first data flow from a server to a client and concurrently creating, in the network address translation data structure, a first entry to coordinate the first data flow from the server to the client;

receiving a command from the server and creating, in the network address translation data structure, a second entry to coordinate a second data flow from the client to the server in response to the command; and

conveying a data element of the second data flow from the client to the server based on the second entry.

22. A data communications device, comprising

a network interface which is capable of connecting to a client and a server;

memory to store a network address translation data structure; and

5 a controller coupled to the network interface and the memory, the controller including:

means for conveying a data element of a first data flow from a server to a client and concurrently creating, in the network address translation data structure, a first entry to coordinate the first data flow from the server to the client;

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means for receiving a command from the server and creating, in the network address translation data structure, a second entry to coordinate a second data flow from the client to the server in response to the command; and

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means for conveying a data element of the second data flow from the client to the server based on the second entry.

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23. In a server, a method for providing content, the method comprising the steps of:
providing a Real-Time Transport Protocol data flow to a client through a
data communications device;

5 sending a packet to the client through the data communications device to
configure a network address translation data structure within the data
communications device; and

10 receiving a Real-Time Transport Protocol Control Protocol packet from
the client through the data communications device based on the network address
translation data structure within the data communications device.

24. The method of claim 23 wherein the packet includes a time-to-live field, and
wherein the step of sending the packet includes the step of:

15 outputting the packet so that initial contents of the time-to-live field
result in expiration of the packet prior to reaching the client.

25. A server, comprising:

a network interface; and

a controller coupled to the network interface, the controller being
configured to:

20 provide a Real-Time Transport Protocol data flow to a client through the
network interface and a data communications device;

send a packet to the client through the network interface and the data
communications device to configure a network address translation data structure
within the data communications device; and

25 receive a Real-Time Transport Protocol Control Protocol packet from the
client through the data communications device and the network interface based
on the network address translation data structure within the data communications
device.

26. The server of claim 25 wherein the packet includes a time-to-live field, and wherein the controller is configured to:

output the packet through the network interface so that initial contents of the time-to-live field result in expiration of the packet prior to reaching the client.

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